

Claims

I claim:

1. An interferometer system having polarization sensitivity, comprising
a reference arm providing a delay line for electromagnetic energy,
5 a sample arm providing a path for incident electromagnetic energy having prescribed polarization characteristics to a sample, and
a detector arranged to detect electromagnetic energy from the delay line and from the sample.
2. A polarization sensitive optical coherence tomography system, comprising the interferometer of claim 1, wherein the electromagnetic energy is light, and further comprising a beamsplitter directing light from a source to the reference arm and to the sample arm and for combining light from the reference and sample arms to direct the combined light to the detector.
3. The system of claim 1, wherein the sample arm includes a polarizer and a
15 polarization adjusting device.
4. The system of claim 3, wherein the polarizer comprises a linear polarizer and the polarization adjusting device comprises an adjustable waveplate.
5. The system of claim 3, wherein the polarization adjusting device comprises an addressable waveplate.
- 20 6. The system of claim 1, wherein the reference arm is absent polarization adjusting components.
7. The system of claim 1, further wherein the detector comprises a photosensitive detector, a lock-in device and a computer for analyzing signals detected by the detector.

- 10
8. The system of claim 1, further comprising further comprising a drive for determining the polarization states of incident electromagnetic energy directed to the sample and detected by the detector.
- 5 9. A retrofit apparatus for making an optical coherence tomography (OCT) system polarization sensitive, comprising a polarizer and a polarization adjusting device positionable in the sample arm of the OCT system.
10. The apparatus of claim 9, wherein the polarizer comprises a linear polarizer.
11. The apparatus of claim 9, wherein the polarization adjusting device comprises an addressable waveplate.
12. A method of retrofitting an optical coherence tomography (OCT) system for polarization sensitivity, comprising inserting in the sample arm of the OCT system a polarization state determining apparatus.
13. The method of claim 12, said inserting comprising placing the polarization state determining apparatus in the sample arm to determine the polarization state of incident illumination probing a sample and a corresponding polarization state for detection of remitted electromagnetic energy from the sample.
14. The method of claim 11, said inserting comprising placing a polarizer and a polarization adjusting device in the sample arm.
- 20 15. The method of claim 14, said placing comprising placing a linear polarizer and a wave plate.
16. The method of claim 14, further comprising carrying out the inserting step with respect to the sample arm while excluding the placing of a polarization state determining apparatus in the reference arm of the OCT system.

- 10
15
20
17. A method of making polarization sensitive optical coherence tomography measurements, comprising
- directing light from a source in a delay line and to a sample while selectively determining the polarization state of light directed to the sample,
- 5 combining light received from the delay line and light from the sample, and detecting the combined light.
18. The method of claim 17, further comprising mathematically analyzing the information from the detected combined light to characterize the sample.
19. The method of claim 17, wherein said directing light from a source in a delay line comprises directing such light without substantially altering polarization state of such light.
20. The method of claim 17, said directing light from a source to a sample, comprising selectively altering the polarization state of the light directed to the sample.
21. The method of claim 20, said selectively altering comprising providing polarized light to a waveplate and adjusting the a waveplate.
22. The method of claim 21, said providing polarized light comprising providing linear (plane) polarized light to the waveplate, and said adjusting comprising adjusting the optical characteristics of the waveplate to change polarization state of light incident on the sample.
23. The method of claim 17, further said combining light comprises combining with light from the delay line light from the sample having substantially the same polarization state as the light illuminating the sample.

24. A method to present measured data from OCT comprising using an HSV color scale such that three parameters are used and plotted, whereby reflectance is mapped into saturation and value and retardance is mapped into hue.